

## ADR Cooling for IR Telescope and Detectors

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Over the last decade, adiabatic demagnetization refrigerators (ADR) have evolved from single-stage systems requiring relatively low heat sink temperatures to multi-stage systems capable of rejecting heat to as high as 5 K. There is now current work focusing on extending this range to as high as 30 K with cooling power at 4 K of 10s to 100s of mW. In this temperature range and cooling capacity ADRs will become suitable for replacing low efficiency sub-10 K mechanical cooler stages, as well as sub-Kelvin instruments. When combined with a 30 K cryocooler or a passive radiative cooler, the high temperature ADR gives a low mass, high efficiency, high reliability, low vibration option for cooling future large space telescopes and instruments. This paper will discuss the relative merits of various ADR and cryocooler configurations, and identify potential trade-offs between the two in an effort to develop guidelines for optimizing total system performance. The paper will also discuss the present status of ADR technology and future development needed to produce an optimal system.